REMARKS/ARGUMENTS

Applicants request the Examiner to reconsider this entire application in view of the proposed claim amendments and the following remarks.

Applicants appreciate the Examiner's indication that claims 9, 10 and 29 would be allowable if rewritten into independent form. Applicants have rewritten claims 9 and 10 into independent form including limitations of their base claims and any intervening claims, while making a further addition to claim 9. Based on the Examiner's indication, claims 9 and 10 should now be allowable. Applicants have further amended clam 29 in addition to rewriting it into independent form, and request the Examiner to review claim 29 again in view of the amendments.

Claim Definiteness Related Issues

Applicants have amended their specification to include headings as the Examiner suggested and correct grammatical and other minor issues, and have attached a substitute specification in "clean" and "mark on" formats showing each such change. Applicants have also amended their Abstract and Title..

In response to the Examiner's claim objections, applicants have amended their claims to more particularly point out the invention. A comma has been added to claim 7, claim 15 has been amended to resolve the antecedent basis problem, claim 23 has been amended as the Examiner suggested but with additional changes, and claim 31 has been amended to provide proper antecedent basis. Applicants have made further changes to claims 1-3, 19, 29 to more particularly point out their invention and added new claims 32-33.

Regarding the Enablement Rejection

Applicants have cancelled claim 11 without prejudice or disclaimer. In response to the Examiner's rejection of dependent claim 25 as allegedly not being supported by the specification as originally filed, claim 25 refers to the originally filed figures 20 (i.e. 20.1, 20.2 and 20.3 together with the originally filed specification starting with the last paragraph on page 19 until the end of page 20. There it is pointed out that the power density is reduced for transmission (TX) with an azimuth angle of 0°:

> "By way of example, Figure 20.1 shows the horizontal polar diagram for transmission (TX pattern), with the reduced transmission power at the azimuth angle of 0°...."

See page 20, starting with line 14.

Additionally, on page 20 of the English translation of the pending application, line 23 discloses polar diagram overlap as follows:

> "Finally, Figure 20.3 shows the overlapping polar diagram as can be seen from Figures 20.1 and 20.2, shown jointly, indicating that the two polar diagrams overlap in the main lobe directions but that, as desired, the transmission power is set to be lower, although the reception power is still optimum, in a possibly critical zone, which is shown in Figure 20.1"

In view of this clear support, applicants believe the technical teaching of claim 25 is fully supported and disclosed in the specification as originally filed.

Prior Art Rejection:

The Examiner rejects claims 1, 3-8, 14-15, 19, 22-23 and 27 as anticipated by Izzat US 2004/0160361 A1. However, Izzat discloses only use of a symmetric designed antenna system -- especially with regard to Figure 1 of Izzat.

In more detail, Izzat discloses an antenna base station system in which one output of the hybrid is connected with a first radiating element (i.e. 3) and the second output of the hybrid is connected with a second radiating system. However, in Izzat's disclosure, the second radiating system is never a single radiating element but only an array system comprising at least two radiating elements or two groups of radiating elements in two columns.

All embodiments discussed by Izzat show antenna systems having three columns of radiating elements arranged in a symmetrical way (one output signal of the hybrid is fed to a radiating element or a group of radiating elements arranged in the middle) whereby the other output signal of the hybrid is fed to the radiating elements or both groups of radiating elements spaced apart on the left and on the right side of the first radiating element or the first group of radiating elements.

By using Izzat's symmetrical design, it is possible to adjust the half width of the antenna system by changing the power splitting between the radiating elements positioned in the column in the middle of the system and the radiating elements positioned in the left or right column, respectively. Izzat shows as well that there is a possibility to adapt the main lobe in the azimuth direction by using an additional phase shifter arrangement as shown in Figure 3 (the output of this differential phase shifter is connected to the radiating elements in the left and right column and not to the radiating elements positioned in the middle). By that step, the phase of the radiating elements in the outer columns can be changed whereby the phase fed to the radiating element in the middle is maintained unchanged.

Izzat does not teach or suggest the feature recited in amended claim 1 of an antenna array using only two antenna element systems using only two columns as recited in amended independent claim 1 herein. It is surprising that an antenna array in accordance to the pending

application (for example with regard to figure 1) using an antenna system with only two radiating elements or two columns with radiating elements works successfully and sufficiently, having in mind that a person skilled in the art would expect that only a symmetrical antenna array such as disclosed by Izzat could be successfully used.

Nor does Izzat teach or suggest the feature recited in independent claim 2 of an antenna array using at least four antenna systems comprising at least four columns. Izzat's teaching at paragraph [0030] to the effect that "it will be appreciated that more elements can be added as required" does not teach or suggest four different antenna systems comprising at least for columns as applicants have recited in independent claim 2 as amended.

One of the advantages reached by an embodiment as disclosed in Figure 1 of the pending application is for example that the inventive antenna array can be realized in a very space saving and non-expensive way. Nevertheless, an antenna array, for example in accordance to Figure 1 of the pending application, allows that the half width could easily be adjusted. Izzat addresses space saving at paragraph [0030] but does not teach or suggest what applicant has claimed.

See also new independent claim 32 which is patentable for the same reasons set forth above.

Dependent claim 3 as amended requires inter alia phase shifting through 180 degrees. Figure 2 and paragraph [0024] of Izzat does not disclose that the hybrid output signals are phase shifted through 180 degrees as applicants have claimed. Figure 2 and [0024] only disclose the use of a phase shifter and the working principles of such a phase shifter which is well-known to an expert. So Izzat only discloses that the output signals of the hybrid have the same phase angle but not a phase angle which is phase shifted through 180 degrees.

With regard to dependent claim 4, the Examiner alleges that Izzat discloses an additional phase adjusting element 31 in Figure 3. However, this additional phase adjusting element 31 does not feed only one antenna element or one group of antenna elements arranged in one single column. Because Izzat discloses that the output signal of this additional phase adjusting element is fed to two radiating elements arranged in two columns spaced apart, Izzat teaches using a differential phase shifter 31 (in Figure 3), whereby in contrary to the exemplary illustrative non-limiting implementation in the pending application, only a linear phase shifter 31 is disclosed in Figure 8.

Dependent claim 19 has been amended to be dependent on independent claim 2 which refers to the embodiment of Figure 12 with at least four hybrid circuits in at least four antenna systems of four columns with antenna radiating elements, respectively.

Originally filed independent method claim 23 has been restricted in a way to require an adjustable horizontal polar diagram using only two columns of radiating elements. This combination is not taught or suggested by Izzat. Figure 10 of Izzat discloses an antenna arrangement with six antennas 101, 102 up to 106 each of which has a main lobe 90, 91 etc. having different half widths. These antennas are directed to different azimuth directions. However, in contrary to Izzat, claim 23 in the pending application concerns one single antenna, an antenna diagram (which has a couple of main lobes). Claim 23 is not obvious with regard to Izzat.

The antenna system disclosed by Rhodes et al. (US 2004/0038714 A1) seems to be closely related to the antenna system disclosed by Izzat. Rhodes et al. discloses a cellular antenna system using three columns with radiating elements. The design is similar to the antenna design of Izzat, for example with regard to Figures 2, 4 etc. In both cases, one phase shifting

signal is fed to radiating elements positioned in the central column whereby a second signal is fed to two or more outer radiating elements positioned on the array at opposite sides of the central radiating element (please review subclaim 3 of Rhodes et al.) Thus, claim 23 as amended is patentable over Rhodes et al for these same reasons.

The Examiner cites Shapira (US 2003/0073463 A1) only with regard to certain dependent claims. Claim 1 as amended is restricted to an antenna element only using two columns (and not more) and another antenna system requires using at least four columns and more. As discussed above, these features are not taught or suggested Izzat, and Shapira does not supply the missing teachings. Shapira discloses the use of separate radiating elements for transmitting signals and for receiving signals. In contrast, the exemplary illustrative non-limiting arrangement shown in Figure 19 of the pending application shows that the same radiating elements are used for transmitting and for receiving signals. Furthermore, in accordance with the pending application, a receiving network and a transmitting network is disclosed which are connected to a combiner or splitter, respectively. In this connection please see the English specification starting on page 19, second paragraph. The RX network 43 or the TX network 45 is a network which basically corresponds to the network as shown in Figure 1 or for example in Figure 12. Figure 5A of Shapira teaches using a linear phase shifter. However, applicants have amended their independent claim 2 to require a differential phase shifter. These features in combination fully distinguishes over Shapira.[1]

Itoh (US 4,667,201) discloses an electronically scanned antenna. Especially in Figure 10A an antenna design is shown using a 180° hybrid with two outputs each of them is connected

[1] Applicants further comment on the Examiner's opinion on page 17 that the use of differential phase shifters is beneficial compared with the use of linear phase shifters. To obtain clearly defined phases and a properly

with a separate phase shifter. The output of the phase shifters in turn are connected to two inputs of a 90° hybrid coupler. The output signals of the hybrid coupler are fed to the couple of radiating elements. This special design using linear phase shifter elements and not differential phase shifters in accordance to the pending application is well-known to a person skilled in the art. Accordingly, applicants claim 23 and 31 as amended distinguish over Itoh for the reasons set forth above. With regard to Figures 12A and 12C of Itoh, applicants wish to point out that the special problem solved by the pending application is not to adjust a couple of different beams but to adjust a "single" (horizontal) diagram by power splitting.

Information Disclosure Statement

The Examiner is apprised of counterpart PCT application WO2005/015690 published on 5 August 2004, and to the associated International Search Report attached hereto. These references were previously submitted for the Examiner's consideration.

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All outstanding issues have been addressed and this application is in condition for allowance. Should any minor issues remain outstanding, the Examiner should contact the undersigned at the telephone number listed below so they can be resolved expeditiously without need of a further written action.

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depending relationship to the phases at both outputs, applicants' illustrative non-limiting implementations use a differential phase shifter instead of linear phase shifters.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____

Robert W. Faris
Reg. No. 31,352

RWF:ejs
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100